Israel's Nuclear Weapons Program

Last changed 10 December 1997

Israel's involvement with nuclear technology literally extends back to the founding of the country in 1948. A host of talented scientists emigrated to Palestine during the thirties and forties, particularly one Ernst David Bergmann - later the director of the Israeli Atomic Energy Commission and the founder of Israel's efforts to develop nuclear weapons. The Weizmann Institute of Science actively supported nuclear research by 1949, with Bergmann heading its chemistry division. Also in 1949, Francis Perrin - French nuclear physicist, atomic energy commissioner, and personal friend of Bergmann's - visited the Weizmann Institute, after which Israeli scientists were invited to the newly established French nuclear research facility at Saclay. A joint research effort was subsequently set up between the two nations.

At this time France's nuclear research capability was quite limited. France had been a leading research center in nuclear physics before the war, but had fallen far behind developments in the US, the USSR, Britain, and even Canada. Israel and France were thus at a similar levels of expertise at the time, and it was possible for Israeli scientists to make valuable contributions. Consequently the development of nuclear science and technology in France and Israel remained closely linked in the early fifties, for example Israeli scientists were involved in the construction of the G-1 plutonium production reactor and UP1 reprocessing plant at Marcoule.

In the 1950s and early 1960s, France and Israel had very close relations. France was Israel's principal arms supplier, and as instability spread in France's colonies in North Africa, Israel provided valuable intelligence obtained from its contacts with sephardic Jews in those countries. The two nations even collaborated (along with Britain) in planning and staging the joint Suez-Sinai operation against Egypt in October 1956. The Suez Crisis, as it became known, proved to be the genesis of Israel's nuclear weapons production program.

Six weeks before the operation Israel felt the time was right to approach France for assistance in building a nuclear reactor. Canada had set a precedent a year earlier when it had agreed to build the 40 MW CIRUS reactor in India. Shimon Peres, a key aide to Prime Minister (and Defense Minister) David Ben Gurion, and Bergmann met with members of the CEA (France's Atomic Energy Commission). An initial understanding to provide a research reactor appears to have been reached during September.

On the whole the Suez operation, launched on 29 October was a disaster. Although Israel's part of the operation was a stunning success, allowing it to occupy the entire Sinai peninsula by 4 November, the French and British invasion on 6 November was a failure. The attempt to advance along the Suez canal bogged down and then collapsed under fierce US and Soviet pressure. Both European nations pulled out, leaving Israel to face the pressure from the two superpowers alone. Soviet premier Bulganin issued an implicit threat of nuclear attack if Israel did not withdraw from the Sinai.

On 7 November 1956, a secret meeting was held between foreign minister Golda Meir, Peres, and French foreign and defense ministers Mssrs. Christian Pineau and Maurice

Bourges-Manoury. The French officials were deeply chagrined by France's failure to support its ally in the operation, and the Israelis were very concerned about the Soviet threat. In this meeting the initial understanding about a research reactor may have been substantially modified, and Peres seems to have secured an agreement to assist Israel in developing a nuclear deterrent.

After some further months of negotiation, the initial agreement for assistance took the form of an 18 MW (thermal) research reactor of the EL-3 type, along with plutonium separation technology. At some point this was officially upgraded to 24 MW, but the actual specifications issued to engineers provided for core cooling ducts sufficient for up to three times this power level, along with a plutonium plant of similar capacity. How this upgrade came about remains unknown.

The reactor was secretly built underground at Dimona, in the Negev desert of southern Israel near Beersheba. Hundreds of French engineers and technicians filled Beersheba which, although it was the biggest town in the Negev, was still a small town. Many of the same contractors who built Marcoule were involved, for example the plutonium separation plants in both France and Israel were built by SGN. The Ground was broken for the EL-102 reactor (as it was known to France) in early 1958. The heavy water for the reactor was purchased from Norway, which sold 20 tons to Israel in 1959 allegedly for use in an experimental power reactor Norway insisted on the right to inspect the heavy water for peaceful use for 32 years, but was permitted to do so only once, in April 1961, prior to it being loaded into the Dimona reactor tank.

Israel used a variety of subterfuges to explain away the activity at Dimona - calling it a "manganese plant" among other things (although apparently not a "textile plant" as most accounts claim). US intelligence became aware of the project before the end of 1958, took picture of the project from U-2 spy planes, and identified the site as a probable reactor complex. The concentration of Frenchmen was certainly impossible to hide.

In 1960, before the reactor was operating, France, now under the leadership of de Gaulle, reconsidered the deal and decided to suspend the project. After several months of negotiation, an agreement was reached in November that allowed the reactor to proceed if Israel promised not the make weapons and announced the project to the world, work on the plutonium plant halted.

On 2 December 1960, before Israel could make the announcement, the US State Department issued a determination that Israel had a secret nuclear installation. By 16 December this became public knowledge with its appearance in the *New York Times*. On 21 December Ben Gurion announced that Israel was building a 24 MW reactor "for peaceful purposes".

Over the next year the relationship between the US and Israel was strained over the issue. The US accepted Israel's claims at face value in public, but exerted pressure privately. Although Israel did allow a cursory inspection by physicists Eugene Wigner and I.I. Rabi, PM Ben Gurion consistently refused to allow international inspections. The final resolution was a commitment from Israel to use the facility for peaceful purposes, and an agreement to admit a US inspection team once a year. These inspections, begun in 1962 and continued until 1969, were only shown the above-ground part of the buildings, which continued down many levels underground. The

above ground areas had simulated control rooms, and access to the underground areas was kept bricked up while the inspectors where present. The most favorable interpretation that can be given to adherence to the pledge is that it has apparently been interpreted by Israel to mean that nuclear weapon development is not excluded if the are used strictly for defensive, and not aggressive purposes. It should be remembered though that Israel's security position in the late fifties and early sixties when the nuclear program was taking shape was far more precarious than it subsequently became after the Six Day War, the establishment of a robust domestic arms industry, and a reliable defense supply line from the US. During the fifties and early sixties a number of attempts by Israel to obtain security guarantees from the US, thus effectively placing Israel under the US nuclear umbrella in a manner similar to NATO or Japan, were rebuffed. If an active policy to restrain Israel's proliferation had been undertaken, along with a secure defense agreement, the development of a nuclear arsenal might have been preventable.

In 1962 the Dimona reactor went critical, and the French resumed work on the plutonium plant, believed to have been completed in 1964 or 1965. The acquisition of this reactor and related technologies was clearly intended for military purposes from the outset (not "dual use") as the reactor has no other function. The security at Dimona (officially the Negev Nuclear Research Center) is stringent, an IAF Mirage was actually shot down in 1967 for straying into Dimona's airspace. There is little doubt then, that some time in the late sixties Israel became the sixth nation to manufacture nuclear weapons.

According to Seymour Hersh, PM Levi Eshkol delayed starting nuclear weapons production even after the Dimona facility was finished. The reactor remained in operation so the plutonium continued to collect, whether it was separated or not. It is generally believed that the first extraction of plutonium occurred in 1965, and that enough plutonium was on hand for one weapon during the Six Day War in 1967 although whether a prototype weapon actually existed or not is unknown. Hersh relates that Moshe Dayan gave the go ahead for starting weapon production in early 1968, which is when the plutonium separation plant presumably went into full operation. After this Israel began producing three to five bombs a year. William Burroms and Robert Windrem, on the other hand, assert in *Critical Mass* that Israel actually had two bombs available for use in 1967, and that Eshkol actually ordered them armed in Israel's first nuclear alert during the Six Day War.

Israel began purchasing Krytrons in 1971. These are ultra high speed electronic switching tubes that are "dual use", having both industrial and nuclear weapons applications.

At 2 p.m. (local) on 6 October 1973 Egypt and Syria attacked Israel in a coordinated surprise attack, starting the Yom Kippur War. Caught with only their standing forces on duty, and these at a low level of readiness, the Israeli front lines were overrun. By early afternoon on 7 October no defensive forces were left in the southern Golan Heights and Syrian forces had reached the edge of the plateau, within sight of the Jordan River. It has been widely reported that this crisis brought Israel to its first nuclear alert. Hersh reports that the decision was made by PM Golda Meir and her "kitchen cabinet" on the night of 8 October. This resulted in the Jericho missiles at Hirbat Zachariah and the nuclear strike F-4s at Tel Nof being armed and prepared for action against Syrian and

Egyptian targets. US Sec. of State Henry Kissinger was apparently notified of this alert several hours later on the morning of 9 October, which helped motivate a US decision to promptly open a resupply pipeline to Israel (Israeli aircraft began picking up supplies that day, the first US flights arrived on 14 October).

Though stockpile depletion remained a concern, the military situation stabilized on October 8 and 9 as Israeli reserves poured into the battle and disaster was averted. Well before significant resupply had reached Israeli forces, the Israelis counterattacked and turned the tide on both fronts. On 11 October a counterattack on the Golan broke the back of Syria's offensive, and on October 15 and 16 Israel launched a surprise crossing of the Suez Canal. Soon the Egyptian Third Army was faced with encirclement and annihilation, with no protective forces remaining between the Israeli Army and Cairo. This prompted Leonid Brezhnev to threaten, on 24 October, to airlift Soviet troops to reinforce the Egyptians. Pres. Nixon's response was to bring the US to world-wide nuclear alert the next day, whereupon Israel went to nuclear alert a second time (according to Hersh, Burrows and Windrem do not recognize this alert). This sudden crisis quickly faded as PM Meir agreed to a ceasefire, relieving the pressure on the Egyptians.

Considerable nuclear collaboration between Israel and South Africa seems to have developed around 1967 and continued through the 70s and 80s. During this period SA was Israel's primary supplier of uranium for Dimona. An open question remains regarding what role Israel had (if any) in the 22 September 1979 nuclear explosion in the south Indian Ocean which is widely believed to be a SA-Israel joint test. This relationship is discussed more fully in the section on South Africa.

Hersh relates extensive (and highly successful) efforts by Israel to obtain targeting data from US intelligence. Much satellite imaging data of the Soviet Union was obtained through the American spy Jonathan Pollard, apparently indicating Israel's intention to use its nuclear arsenal as a deterrent, political lever, or retaliatory capability against the Soviet Union itself.

Satellite imagery from a US KH-11 satellite for example was used to plan the 7 June 1981 attack on the Tammuz-1 reactor at Osiraq, Iraq. This attack, carried out by 8 F-16s accompanied by 6 F-15s punched a hole in the concrete reactor dome before the reactor began operation (and just days before an Israeli election) and delivered 15 delay-fuzed 2000 lb bombs deep into the reactor structure (the 16th bomb hit a nearby hall). The blasts shredded the reactor and blew out the dome foundations, causing it to collapse on the rubble. This was the world's first attack on a nuclear reactor.

Since 19 September 1988 Israel has had its own satellite reconnaissance system and thus no longer needs to rely on US sources. On that day the Offeq-1 satellite was launched on the Shavit booster, a system closely related to the Jericho-2 missile. Offeq-2 went up on 3 April 1990. The launch of the Offeq-3 failed on its first attempton 15 September 1994, but was retried successfully 05 April 1995.

Both Hersh and Burrows and Windrem agree that Israel went on full scale nuclear alert again on the first day of Desert Storm, 18 January 1991, when 7 Scud missiles were fired against the cities of Tel Aviv and Haifa by Iraq (only 2 actually hit Tel Aviv and 1 hit Haifa). This alert apparently lasted for the duration of the war (43 days). Threats of

retaliation by the Shamir government if the Iraqis used chemical warheads are interpreted to mean that Israel intended to launch a nuclear strike if gas attacks occurred.

http://nuclearweaponarchive.org/Israel/Isrhist.html

Israel's Nuclear Weapons Program

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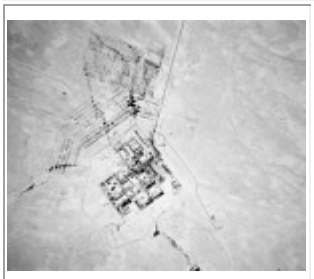
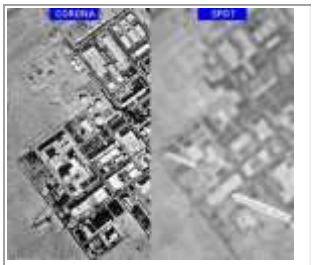
Israel is believed to possess the largest and most sophisticated arsenal outside of the five declared nuclear powers. Israel has never admitted possessing nuclear weapons, but abundant information is available showing that the capability exists.

The center of Israel's weapons program is the Negev Nuclear Research Center near the desert town of Dimona (the center is usually identified simply as "Dimona"). A nuclear reactor and plutonium production facility was built by France at this facility in the late 1950s and early 60s. All of the production and fabrication of special nuclear materials (plutonium, lithium-6 deuteride, and enriched and unenriched uranium) occurs at Dimona although the design and assembly of nuclear weapons occurs elsewhere.

Click on images for close-ups	
	This is an image of the Dimona facility taken by a US Corona spy satellite in 1971 (Mission 1115-2, 29 September 1971, Frame: 52, 53). It is physically impossible to take a similar image within the atmosphere as Israel jealously protects the airspace above Dimona. In the 1960s an Israeli Airforce Mirage was shot down when it accidentally ventured too close to Dimona.
	A close-up of the same Corona frames.
	Side-by-side comparison of a Corona image and the much lower resolution SPOT commercial imaging satellite. The SPOT image lables the Dimona nuclear reactor dome and Machon 2 which houses the plutonium separation plant.
Satellite images courtesy John Pike at the Federation of American Scientists, see the FAS Intelligence Resource Program page. The SPOT Image was acquired and exploited by Peter Zimmerman.	


The Dimona Reactor Dome (courtesy Mordechai Vanunu) (34 K)


Mordechai Vanunu (17 K)

The most specific and detailed information to be made public about its nuclear program came from a former mid-level nuclear technician named Mordechai Vanunu. Vanunu had worked at the Machon 2 facility, where plutonium is produced and bomb components fabricated, for 9 years before his increasing involvement in left wing pro-Palestinian politics led to his dismissal in 1986. Due to lax internal security, prior to his departure he managed to take about 60 photographs covering nearly every part of Machon 2.


Mordechai Vanunu (35 K)

After travelling around the world for several months in Bohemian style, he converted to Christianity in Australia. The religious group he associated with has an activist anti-nuclear bent and he soon decided to make public his knowledge of Israel's nuclear weapons capability. He made contact with the *London Sunday Times* which flew him to London and began preparing an exclusive news story. Unfortunately for Vanunu, the Israeli government had found out about his activities and the Mossad arranged to kidnap him and bring him back to Israel for trial.


Mordechai Vanunu revealing details of his capture (39 K)

For an even bigger image (57 K) click here.

He was successfully lured into a trap by a female Israeli agent named Cheryl Bentov operating under the name of "Cindy". His sudden disappearance before the publication of the Sunday Times story was mysterious at the time. The story was finally published several days later on 5 October 1986. A few months later Vanunu's status as a prisoner of the Israeli government was confirmed when it was revealed that he would stand trial. Despite being essentially incommunicado, Vanunu managed to reveal details of his capture in dramatic fashion when he wrote the information on the palm of his hand, and held it up for news photographers as he was being whisked away from the courthouse.

As described by Vanunu, the Dimona complex has nine buildings ("Machons", Hebrew for "facility") including to the reactor building. The plant employs 2700 people.

Control room of the Machon 2 plutonium separation plant (courtesy Mordechai

- Machon 1 is the reactor building with its 60 foot silver dome.
- Machon 2 is where Vanunu worked, along 150 other people. From outside, Machon 2 is a nondescript two story windowless building 80 feet wide and 200 feet long. The above-ground structure houses an air filtration plant, some offices, storage space, and a worker's canteen. Also in the structure is the entrance to limited access elevators that transport people to the six underground levels, extending eightly feet below the surface. This hidden area houses an automated Purex plutonium separation plant, plutonium fabrication and reclamation shops, and fabrication shops for bomb components made out of lithium deuteride and beryllium. The separation plant is housed in a production hall (called "The Tunnel" that occupies the first four levels. Level 5 is the fabrication area for plutonium, lithium deuteride, and beryllium. The Tunnel normally operates one 34 week long "production campaign" each year, being closed for servicing and refurbishment the rest of the year.
- Machon 3 is a chemical plant that produces lithium-6 deuteride and also processes natural uranium and fabricates reactor fuel rods.
- Machon 4 is a waste treatment plant for the radioactive effluent from the plutonium extraction process in Machon 2 . This plant presumably converts the waste products for convenient disposal, and may also separate the uranium for reuse.
- Machon 5 coats the uranium fuel rodes with aluminum.
- Machon 6 is the physical plant for Dimona, providing power and other services.
- Machon 8 (there is no Machon 7) contains a laboratory for testing and process development. This building houses Unit 840, which operates gas centrifuges for enriching uranium.

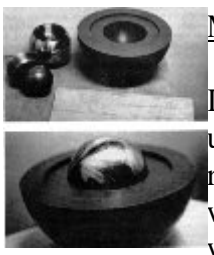
- Machon 9 houses a laser isotope enrichment plant, also for enriching uranium.
- Machon 10 produces depleted uranium metal for anti-armor ammunition use.

Bomb components made of plutonium, lithium-6 deuteride, and beryllium are fabricated in level 5 of Machon 2. They are transported by convoys of unmarked cars to the warhead assembly facility, operated by Rafael north of Haifa.

The principal uncertainty in evaluating Israel's weapon production capability is the actual power level of the Dimona reactor. It has long been believed that Israel has upgraded the reactor repeatedly to increase its plutonium production. Vanunu claimed that Israel possessed 100-200 nuclear weapons (implying some 400-800 kg of plutonium) and can produce 40 kg of plutonium a year. This production figure indicates an average operating power of 150 MW thermal. Analysts generally discount figures this high, and the consensus is that it was initially operated at 40 MW and was upgraded to 70 MW sometime before 1977. A 1996 study by the Stockholm International Peace Research Institute (SIPRI) produced a somewhat lower range of estimates, concluding that Israel has produced 330-580 kg of plutonium through 1995, enough for a stockpile of 80-150 efficient weapons (the extreme estimate range was 190 to 880 kg).

Vanunu provided information indicating that the uranium fuel is subjected to burnups of 400 MW-days/tonne, a figure similar to that used by the US early in its weapons production program. This results in a high grade plutonium with a Pu-240 content of 2%. According to Vanunu 140 fuel rods are irradiated for periods of about three months before discharge for plutonium extraction. At 70 MW the Dimona reactor would consume some 48 tonnes of fuel a year and produce about 18 kg of plutonium.

Vanunu also claimed that Israel possessed fusion boosted weapons, and has developed hydrogen bomb technology. He provided information about both lithium-6 and tritium production. He stated that initially tritium was produced by a facility in Machon 2 called Unit 92 by separating it from the heavy water moderator where it is produced in small amounts as a by-product. In 1984 production was expanded when a new facility called Unit 93 was opened to extract tritium from enriched lithium that had been irradiated in the reactor. The large scale production of tritium by Israel has been confirmed by South Africa, which received a shipments of tritium totalling 30 g during 1977-79. This clearly indicates tritium production on a scale sufficient for a weapon boosting program. It is difficult to find any other rationale for such a large tritium production capability except some sort of thermonuclear weapon application.



Mock-up of an Israeli Bomb (courtesy Mordechai Vanunu) (46 K)

It is quite difficult to develop gas fusion boosting technology like that used in US weapons and weapons tests are probably essential. Although radiation implosion weapons could be developed without testing, they would tend to be large and heavy and would perhaps be incompatible with Israel's available delivery systems. It is quite possible then that a Sloika/Alarm Clock type system has been developed using lithium-6 deuteride fuel surrounding the plutonium core (in fact a weapon mock-up photographed by Vanunu appears to be this type of weapon). Tritium could be used to spike the fusion fuel and boost the yield, just as the Soviets did with the 400 Kt "Joe-4".

Bomb components made of plutonium, lithium-6 deuteride, and beryllium are fabricated in level 5 of Machon 2. They are transported by convoys of unmarked cars to the warhead assembly facility, operated by Rafael north of Haifa.

Hersh reports (without any stated source) that Israel has developed an extensive array of tactical nuclear weapons: efficient compact boosted fission bombs, neutron bombs (allegedly numbering in the hundreds by the mid-eighties), nuclear artillery shells, and nuclear mines. With an arsenal that is quite possibly in excess of 100 weapons it is likely that some of the nuclear materials would be applied tactical weapons. Boosted bombs are doubtful, as are neutron bombs, due to problems with development in the absence of a significant testing program. Neutron bombs also require very large amounts of tritium (20-30 g per weapon) which would impact the production of plutonium quite seriously (each gram of tritium displaces 80 grams of plutonium production). Artillery shells are also doubtful due to their wastefulness in plutonium. Tactical weapons are probably aircraft or missile delivered, or are pre-emplaced mines.

Burrows and Windrem claim (without indicating a source) that Israel has produced 300 warheads, including those that have since been dismantled. They place the current arsenal at about 200 weapons.

Several reports have surfaced claiming that Israel has some uranium enrichment capability at Dimona. Vanunu asserted that gas centrifuges were operating in Machon 8, and that a laser enrichment plant was being operated in Machon 9 (Israel holds a 1973 patent on laser isotopic enrichment). According to Vanunu the production-scale plant has been operating since 1979-80. The scale of a centrifuge operation would necessarily be limited due to space constraints, and might be focused toward enriching depleted reactor fuel to more efficiently use Israel's uranium supply. A laser enrichment system, if developed to operational status, could be quite compact however and might be producing weapon grade material in substantial quantities. If highly enriched uranium is being produced in substantial quantities, then Israel's nuclear arsenal could be much larger than estimated solely from plutonium production.

Reports that Zalman Shapiro, the American owner of the nuclear fuel processing company NUMEC, supplied enriched uranium to Israel in the 1960s seems to have been authoritatively refuted by Hersh.

Israel produces uranium domestically as a by-product of phosphate mining near the Dead Sea but this amounts to only 10 tons a year, and is grossly insufficient for its needs. Israel has addressed this shortfall by reprocessing the low burnup spent fuel to recover uranium (which most nations do not do). It is also known to have purchased at least 200 tons of natural uranium on the world market under an alias. A major source though was some 600 tons of uranium provided by South Africa in a quid pro quo for Israel's assistance on its weapons program. Combined with uranium recycling, and the possible use of enrichment to stretch the uranium supply, these quantities may be sufficient to account for Dimona's fuel supply to the present date (1997).

Israel can undoubtedly deploy nuclear weapons using its capable air force. The aircraft and crews dedicated to nuclear weapons delivery are located at the Tel Nof airbase. Originally the F-4 Phantom II acquired in 1969 was probably the designated carrier, today it would be the F-16. The F-16 has an unrefueled radius of action of 1250 km,

extending out to western Iran, the shores of the Black Sea, Riyadh, or the Libyan border. With refueling it can travel much farther of course, and an unrefueled one-way mission could take it as far as Moscow.

Israel also possesses medium-range ballistic missiles: the Jericho-1 (Ya-1 "Luz") with a 500 kg payload, and a range of 480-650 km (operational since 1973); and the Jericho 2 (either Ya-2 or Ya-3) with a 1000 kg payload and a range of over 1500 km (operational since 1990). Under development is the Jericho-2B with a range of 2,500 km. These missiles were almost certainly developed specifically as nuclear delivery systems (although chemical warheads cannot be ruled out). About 50 Jericho-1s and 50 Jericho-2s are believed to have been deployed. Israel also has a 100 or more US supplied Lance tactical missiles, with a range of 115 km (72 miles). Although these were supplied with conventional warheads, they could have been outfitted with nuclear or chemical ones.

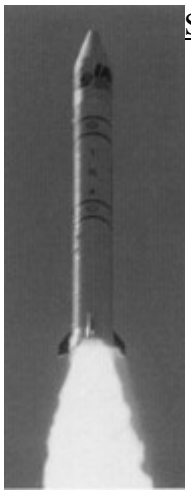
Jericho 1

This is believed to be named *Luz* and designated YA-1 by Israel. It is based on the French missile MD-600 built by Dassault and was developed during the 1960s.

Specifications
Length: 10 m
Width 1.0 m
Launch weight 4500 kg
Propulsion: Two stage solid propellant
Range: 500 km
Payload: 500 kg

Jericho 2

Jericho-2 development is indigenous, and started soon after the Jericho-1 was deployed. Test launches began in 1986 and the first two had ranges of 465 km (1986) and 820 km (1987). The Jericho-2 shares the first two stages of the civilian Shavit (Comet) space launch vehicle, which has launched Israel's four satellites, the Offeq-1, 2, and 3 reconnaissance satellites, and the Amos communications satellite.



Shavit space launch vehicle, Offeq-2 launch on 3 April 1990 (13 K)

Specifications
Length: 12 m
Width 1.2 m
Launch weight 6500 kg
Propulsion: Two stage solid propellant
Range: 1500 km
Payload: 1000 kg

The Jericho 1 and 2 are deployed near Kfar Zachariah and Sderot Micha in the Judean foothills, about 23 km east of Jerusalem (and about 40 km southeast of Tel Aviv). Located a few kilometers to the northwest is Tel Nof air base. Images of the missile complex made by commercial satellites have been published in recent years, and September 1997 *Jane's Intelligence Review* published a 3-D analysis of high resolution pictures taken by the Indian IRS-C satellite.

The complex is compact - smaller than 6 km x 4 km. The missiles are mobile, being deployed on transporter-erector-launchers (TELs), and are based in bunkers tunneled into the side of the limestone hills. There are no signs of missile silos. TELs require firm, accurately leveled ground in order to launch, and maximum missile accuracy requires pre-surveyed launch points. Consequently there are a number of prepared launch pads (paved culs-de-sac) connected to these bunkers by paved roads. Images of an actual Jericho 2 TEL indicate that it is about 16 m long, 4 m wide, and 3 m high. It is accompanied by three support vehicles (probably a power supply vehicle, a firing control vehicle, and a communications vehicle). The Zachariah missile base was enlarged between 1989 and 1993 during the Jericho-2 deployment. A few kilometers north of Tel Nof is the Be'er Yaakov factory where the Jericho missiles and the Shavit are believed to have been manufactured.

From its deployment location in central Israel the Jericho-1 missile can reach such targets as Damascus, Aleppo, and Cairo. The Jericho-2 can reach any part of Syria or Iraq, and as far as Teheran, and Benghazi, Libya. The Jericho-2B will be able to reach any part of Libya or Iran, and as far as southern Russia. The short range of the Lance limits it mainly to battlefield use, although the Syrian capital of Damascus is in range from much of northern Israel. According to *Jane's World Air Forces*, Israel has three Jericho-equipped missile squadrons.

Also located at the site are a group of 21 bunkers thought to contain nuclear gravity bombs. Five of the larger ones are about 15 m wide and 20 m long, and rise 6 m above ground.

Israel has taken active steps to prevent nations that are officially at war with it from acquiring nuclear capabilities. The bombing of the Osiraq reactor in Iraq in 1981 is the

most famous case, but an earlier sabotage of the reactor core in France prior to shipment is probably attributable to Mossad.

Israel's official policy is that it will not be the first nation to introduce nuclear weapons into the Middle East. In contrast to the coy hinting of some undeclared weapon's states, Israel thus actively denies possessing nuclear weapons. Its obvious capability in this regard has thus established de facto deterrence, while minimizing (but not eliminating) domestic and international controversy.

http://nuclearweaponarchive.org/Israel/index.html